TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT

CONTAMINATION CONTROL DURING EXCAVATION ACTIVITIES

Identification No.: RL-SS49
Date: March 2001

Program: Environmental Restoration
OPS Office/Site: Richland Operations Office/Hanford Site
Operable Unit (s): 300-FF-2
PBS No.: RL-RS01 (RL-ER03)
Waste Stream: (Disposition Map Designation: T3-ER [technical risk score 5])
TSD Title: N/A
Waste Management Unit (if applicable): N/A
Facility: N/A

***Priority Rating*:**

This entry addresses the "Accelerated Cleanup: Paths to Closure (ACPC)" priority:

_X_ 1. Critical to the success of the ACPC
____ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays)
____ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

***Need Title*:** Contamination control during excavation activities

Need/Opportunity Category: Technology Need

***Need Description*:** Technologies are needed to control the physical dispersion of TRU and high dose rate contaminated material and to provide appropriate shielding of radiation from these materials during all phases of burial ground excavation.

Schedule Requirements:

Earliest Date Required: 9/30/04

Latest Date Required: 9/30/12
Remedial design for the burial grounds is scheduled to begin in 2005.

***Problem Description*:**
This need pertains to two burial grounds located north of Hanford's 300 Area. A summary of the construction and waste contents for each burial ground are described below.

618-10 Burial Ground
The 618-10 burial ground is approximately 148 m by 143 m (485 ft by 470 ft) oriented northwest by southeast and consists of 12 trenches and 94 vertical pipe units. The vertical pipe units were constructed from six 208-L (55-gallon) drums welded together end-to-end. The trenches were constructed with dimensions ranging from 15 m to 98 m (50 ft to 320 ft) in length and 12 m to 21 m (40 ft to 70 ft) in width; depth of the trenches was 7.6 m (25 ft). The burial ground has been stabilized with a cover of clean fill.

The 618-10 burial ground received high-level, low-level, and TRU waste. Until 1960 some high-level and TRU wastes were disposed of in cardboard containers with contact doses up to 500 R/h, although most high-level waste was interred in concrete-filled 208-L (55-gallon) drums. After 1960, the high-level waste was packaged in "milk pail" disposal cans and interred in the vertical pipe units. Total TRU estimate for the 618-10 site is one to two kg dispersed throughout the site. During stabilization activities at the site in 1983, a quantity of oil appeared on the surface after heavy equipment drove over a portion of the site.

618-11 Burial Ground
The 618-11 burial ground is approximately 114 m by 305 m (375 ft by 1000 ft) oriented east-west and consists 3 trenches, 50 vertical pipe units (constructed from six 208-L (55-gallon) drums welded together end-to-end), and five 2.4-m- (8-ft) diameter caissons (constructed from 3-m (10-foot) lengths of eight-gauge corrugated steel pipe). The trenches were 274 m (900 ft) long and 15 m (50 ft wide); depth of the trenches was 7.6 m (25 ft). The burial ground has been stabilized with a cover of clean fill.

The 618-11 burial ground received high-level, low-level, and TRU waste. As in the 618-10 burial ground, some high-level and TRU wastes were disposed of in cardboard containers with contact doses up to 500 R/h, although most high-level waste was interred in the vertical pipe units and, after June 1964, in the caissons. Waste materials in vertical pipe units and caissons may be packed inside cans of various sizes (e.g., 1-L, 19-L, 57-L [quart, 5-gallon, 15 gallon]). Some TRU waste was encased in concrete for disposal to burial ground trenches. Total TRU estimate for the 618-11 site is five to ten kg dispersed throughout the site.

Chemical species in the burial grounds may include solid metallic sodium, beryllium residues, contaminated lead shielding, technetium oxide, promethium oxide, zirconium cladding, potentially pyrophoric metal turnings, thorium oxide, other thorium compounds, and uranium compounds. Radioactive isotopes may include ^{14}C, ^{60}Co, ^{65}Zn, ^{90}Sr, ^{103}Ru, ^{131}I, ^{137}Cs, ^{144}Ce, ^{147}Pm, ^{226}Ra, ^{232}Th, ^{233}U, ^{235}U, ^{237}Np, ^{238}U, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am, and ^{244}Cm.

Additional information about the wastes in the 618-10/11 burial grounds is described in "Characterization of the 618-11 Solid Waste Burial Ground, Disposed Waste, and Description of

the Waste-Generating Facilities", 1997, Waste Management Federal Services, Richland, WA, HNF-EP-0649, Rev 0.

It is anticipated that burial ground remediation will be implemented through the following major steps.

- Delineation of burial-ground boundaries
- Pre-excavation waste identification for site excavation planning
- Excavation, characterization & segregation - technologies will be needed for remote handling, field characterization, environmental controls, and waste segregation during excavation operations to minimize worker exposure and environmental hazards
- Waste handling and transport – technologies will be needed for characterization, segregation, and packaging of the excavated waste in a form suitable for transport away from the burial ground area
- Final disposal

Benefit to the Project Baseline of Filling Need: As identified in the Technology Alternatives Baseline document for the 618-10/11 burial grounds (BHI-01484, http://www.bhi-erc.com/library/bhi/bhi01484.pdf), there are currently technology gaps associated with appropriate technologies for controlling the spread of contamination and shielding radiation during excavation of the type of materials expected in the 618-10/11 burial grounds. Development of suitable technologies is needed as part of identifying the most effective technical approach for burial ground remediation.

***Functional Performance Requirements*:** The technology must be able to operate in a burial ground environment. Technologies are needed that can provide physical containment and shielding during retrieval of boxed waste (potentially damaged), debris of variable size and shape, and contaminated soils. Technologies are also needed that can provide containment and shielding during retrieval of waste in caissons and from the vertical pipe units described in the Problem Description.

Work Breakdown Structure (WBS) No. : 1.4.03.2.1 (RL-RS01) ***TIP No.:*** TIP 0003

Relevant PBS Milestone: PBS-MC-028, M-16-00B

***Justification For Need*:**

Technical: The Technology Alternative Baseline document prepared for the 618-10/11 burial grounds identified that technologies directly suitable for physical containment and shielding during excavation of high dose rate and TRU materials in burial ground environments were not available.

Regulatory: Washington State air regulations will require controls to minimize the release of radionuclides into the environment.

Environmental Safety & Health: Worker safety and requirements for handling high dose rate and TRU materials are primary reasons for the stated need for containment and shielding technologies.

Potential Life-Cycle Cost Savings of Need (in $000s) and Cost Savings Explanation: This need is for an enabling technology with a primary benefit of reducing worker risk.

Cultural/Stakeholder Concerns: The primary concern related to this need is ensuring the safety of workers, the public, and the environment during burial ground remediation operations.

Other: None

Current Baseline Technology: N/A

End-User: Richland Environmental Restoration Project

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